

CLAIMS

1. An antibody for detecting a monocyte marker, which binds to a protein or a polypeptide selected from the group of:

- 5 (1) an HIDE1 protein;
(2) a protein encoded by a nucleotide sequence that hybridizes to a complementary sequence of an HIDE1 gene under stringent conditions; and
(3) a polypeptide fragment with at least eight amino acid residues, wherein the fragment is derived from the protein of the above (1) or (2).

10 2. A method for detecting a monocyte, which comprises the steps of:

- (1) contacting the antibody of claim 1 with a blood cell sample predicted to comprise a monocyte, and
(2) detecting a blood cell that has bound to the antibody in step (1).

15 3. A method for isolating a monocyte, which comprises the steps of:

- (1) contacting the antibody of claim 1 with a blood cell sample predicted to comprise a monocyte, and
(2) collecting a blood cell that has bound to the antibody in step (1).

20 4. The method of claim 2 or 3, wherein the blood cell sample is peripheral blood, cord blood, or bone marrow.

25 5. A kit for detecting and/or isolating a monocyte, which comprises the antibody of claim 1.

6. A method for inducing a dendritic cell from a monocyte *in vitro*, which comprises the steps of:

- 30 (1) culturing a monocyte in the presence of a differentiation inducing factor for a dendritic cell ;
and
(2) contacting a cell cultured in step (1) with the antibody of claim 1, detecting HIDE1 expression, and judging that the differentiation of a monocyte into a dendritic cell is induced when the expression level of HIDE1 is reduced.

35 7. The method of claim 6, wherein the differentiation inducing factor for a dendritic cell is a combination of GM-CSF and IL-4.

8. A method for inducing a macrophage from a monocyte *in vitro*, which comprises the steps of:

(1) culturing a monocyte in the presence of a differentiation inducing factor for a macrophage;

5 and

(2) contacting a cell cultured in step (1) with the antibody of claim 1, detecting HIDE1 expression, and judging that the differentiation of a monocyte into a macrophage-like cell is induced when the expression level of HIDE1 is reduced.

10 9. The method of claim 8, wherein the differentiation inducing factor for a macrophage is phorbol ester.

10. A method for obtaining a dendritic cell, which comprises the steps of:

(1) contacting a sample of collected blood cells with the antibody of claim 1;

15 (2) collecting a blood cell that has bound to the antibody in step (1);

(3) culturing the blood cell collected in step (2) in the presence of a differentiation inducing factor for a dendritic cell;

(4) contacting the cell cultured in step (3) with the antibody of claim 1, detecting HIDE1 expression, and judging that a monocyte is differentiated into a dendritic cell when the expression level of HIDE1 is reduced; and

20 (5) isolating as a dendritic cell the cell judged to be differentiated in step (4).

11. The method of claim 10, which further comprises the step of allowing the isolated dendritic cell to ingest an antigen.

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12. The method of claim 10, wherein the isolated dendritic cell is used to prevent and/or treat a tumor.

13. The method of claim 12, which further comprises the step of allowing the isolated dendritic cell to ingest a tumor-specific antigen.

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14. The method of claim 10, wherein the isolated dendritic cell is used to prevent and/or treat an autoimmune disease, or to relieve rejection after an organ transplantation.

35 15. A method for obtaining a macrophage, which comprises the steps of:

(1) contacting a sample of collected blood cells with the antibody of claim 1;

- (2) collecting a blood cell that has bound to the antibody in step(1);
- (3) culturing the blood cell collected in step (2) in the presence of a differentiation inducing factor for a macrophage;
- (4) contacting the cell cultured in step (3) with the antibody of claim 1, detecting HIDE1
- 5 expression, and judging that a monocyte is differentiated into a macrophage-like cell when the expression level of HIDE1 is reduced; and
- (5) isolating as a macrophage the cell judged to be differentiated in step (4).

10 16. The method of claim 15, which further comprises the step of activating the isolated cell.

15 17. The method of claim 15 or 16, wherein the isolated macrophage is used to treat a spinal cord damage, and/or to treat and/or prevent a tumor, infectious disease, autoimmune disease, or immunodeficiency disease.

18. A method for collecting a lymphocyte, which comprises the steps of:
(1) contacting the antibody of claim 1 with a blood cell sample predicted to comprise a lymphocyte; and
(2) collecting a blood cell that did not bind to the antibody in step (1).

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19. A method for obtaining an activated lymphocyte, which comprises the steps of:
(1) contacting the antibody of claim 1 with a blood cell sample predicted to comprise a lymphocyte;
(2) collecting as a lymphocyte a blood cell that is not bound to the antibody;
25 (3) culturing the lymphocyte collected in step (2); and
(4) activating the lymphocyte cultured in step (3) and collecting the activated lymphocyte.

20. The method of claim 18 or 19, wherein the blood cell sample is peripheral blood, cord blood, or bone marrow.

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21. The method of claim 19, wherein the activated lymphocyte is used to prevent and/or treat a tumor or infectious disease.